UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,452	03/26/2004	Sehat Sutardja	MP0467	8949

26703 7590 07/21/2008

HARNESS, DICKEY & PIERCE P.L.C.
5445 CORPORATE DRIVE
SUITE 200
TROY, MI 48098

EXAMINER	
VU, BAO Q	
ART UNIT	PAPER NUMBER
2838	
MAIL DATE	DELIVERY MODE
07/21/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/810,452
Filing Date: March 26, 2004
Appellant(s): SUTARDJA, SEHAT

Mike D. Wiggins
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 3-18-08 appealing from the Office action mailed 10-19-07.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,512,352	QIAN	1-2003
6,404,175	YANG et al.	6-2002
6,184,666	BOECKMANN et al.	2-2001
6,166,527	DWELLEY et al.	12-2000

(9) Grounds of Rejection

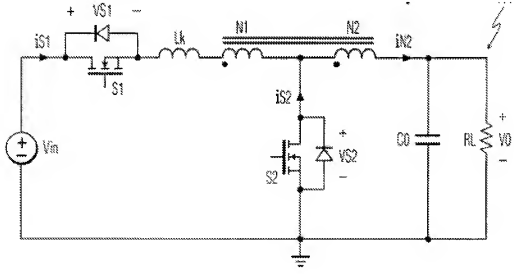
The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 4, 5, 6, 9, 11, 14, 15, 16, 19, 21 and 23 rejected under 35 U.S.C. 103(a) as being unpatentable over Qian (USP 6,512,352) in view of Lu et al. (USP 5,636,107). Qian discloses the claimed invention a coupled inductor with first, N1, and second, N2, windings connected in series to form a common node, a conduction switch, S1, and a freewheeling switch, S2, the inductor is formed on a single core, and an output capacitor, Co. See figure below.



3. Qian discloses the claimed invention except for turns ratios of the inductor devices. Lu discloses that it is known in the art to provide the turns ratios of the inductor devices of having a relationship of the N1/N2 windings of the transformer to be 2. The turns ratio indicates the amount by which the transformer increases or decreases the voltage applied to the primary. For example, if the secondary of a transformer has two times as many turns as the primary, the voltage induced into the secondary will be two times the voltage across the primary. (As is with the case of applicant's claimed invention). If the secondary has one-half as many turns as the primary, the voltage across the secondary will be one-half the voltage across the primary. However, the turns ratio and the current ratio of a transformer have an inverse relationship. Thus, a 1:2 step-up transformer will have one-half the current in the secondary as in the primary. A 2:1 step-down transformer will have twice the current in the secondary as in the primary. (As is with the case of applicant's claimed invention).

It would have been obvious to one having ordinary skill in the art at the time of the invention was made to provide the turns ratios of the inductor devices of having a relationship of the N1/N2 windings of the transformer to be 2 of Lu with the controlled inductive switching circuit of Qian, in order to provide a simplistic approach to control the output voltage and output current induced in the secondary by changing the turns ratio of the transformer.

2144.05 Obviousness of Ranges [R-1]

>See MPEP § 2131.03 for case law pertaining to rejections based on the anticipation of ranges under 35 U.S.C. 102 and 35 U.S.C. 102 / 103.

OPTIMIZATION WITHIN PRIOR ART CONDITIONS OR THROUGH ROUTINE EXPERIMENTATION

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W] here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40C and 80C and an acid concentration between 25 and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100C and an acid concentration of 10%.). See also In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (Claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable there over because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or molar proportions.). For more recent cases applying this principle, see Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989), and In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990).

ONLY RESULT-EFFECTIVE VARIABLES CAN BE OPTIMIZED

A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed wastewater treatment device had a tank volume to contractor area of 0.12 gal. / sq.ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result-effective variable.). See also In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) (prior art suggested proportional balancing to achieve desired results in the formation of an alloy).

Qian and Lu discloses the claimed invention except for having a transformer coefficient coupling of equal or greater than 0.99. It would have been obvious to one having ordinary skill in the art at the time the invention was made to a transformer coefficient coupling of equal or greater than 0.99, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

The extent to which flux generated in one winding links the other winding is expressed in terms of the winding's coupling coefficient: a coupling coefficient of unity (1), implies perfect coupling (i.e. all the flux which links that winding also links the other winding) and an absence

of leakage flux (i.e. none of the flux which links that winding alone). From a circuit viewpoint, the effects of leakage flux (inductance) are accounted for by associating an equivalent lumped value of leakage inductance with each winding. An increase in the coupling coefficient translates into a reduction in leakage inductance: as the coupling coefficient approaches unity, the leakage inductance of the winding approaches. Therefore it would have been obvious to one of ordinary skill in the art to use a transformer with coefficient of coupling near unity (optimum value) if it was possible knowing the inherent inefficiencies of high leakage inductances associated with low coefficient of coupling which were not achievable at the time of the prior art as opposed to the present where high coefficient of coupling are achieved now near unity.

4. Claims 7 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Qian (USP 6,512,352) in view of Lu et al. (USP 5,636,107) and further in view of Boeckman et al. (USP 6,184,666). Qian and Lu disclose the claimed invention (see above paragraphs) except for the independently controlled parallel switches. Boeckman discloses that it is known in the art to provide the independently controlled parallel switches. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to provide the independently controlled parallel switches of Boeckman with the controlled inductive switching circuit having a turns ratio of 2 of Qian and Lu, in order to reduce the heated generated by either switch when in operation to create a redundancy to handled higher voltages and reduces the failure rate of the switches.

5. Claims 10, 22, 20, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Qian (USP 6,512,352) in view of Lu et al. (USP 5,636,107) and further in view of Yang et al.

(USP 6,404,175). Qian and Lu disclose the claimed invention (see above paragraph 2) except for the parallel-connected voltage regulators with the phase controller. Yang discloses that it is known in the art to provide the parallel-connected voltage regulators with the phase controller. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to provide the parallel-connected voltage regulators with the phase controller of Yang with the controlled inductive switching circuit having a turns ratio of 2 of Qian and Lu, in order provide a controlled current sharing and current balancing techniques achieved by utilizing the parallel-connected voltage regulators with the phase controller.

6. Claims 8, 18 and 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Qian (USP 6,512,352) in view of Lu et al. (USP 5,636,107) and further in view of Dwelley et al. (USP 6,166,527). Qian and Lu disclose the claimed invention (see above paragraph 2) except for the on-time conduction controller with multi-level gate driver circuit. Dwelley discloses that it is known in the art to provide the on-time conduction controller with multi-level gate driver circuit. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to provide with the controlled inductive switching circuit having a turns ratio of 2 of Qian and Lu, with the on-time conduction controller with multi-level gate driver circuit of Dwelley, in order to provide a controlled switching scheme that conserves power by driving less than all the switches when the input voltage is higher or lower than the output voltage.

(10) Response to Argument

A. The Examiner's rejection of Claims 1, 4, 5, 6, 9, 11, 14, 15, 16, 19, 21 and 23 under 35 U.S.C. § 103(a) as being unpatentable over Qian (U.S. Pat. No. 6,512,352) in view of Lu et al (U.S. Pat. No. 5,636,107) is proper and should be sustained.

1. Claim 1

The Qian reference is in the same problem solving area as the claimed invention and does not teach away from the claimed invention. See figures below for comparison.

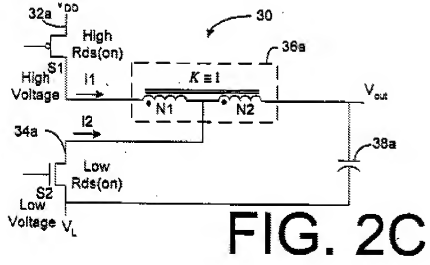


FIG. 2C

APPELLANT'S CLAIMED INVENTION

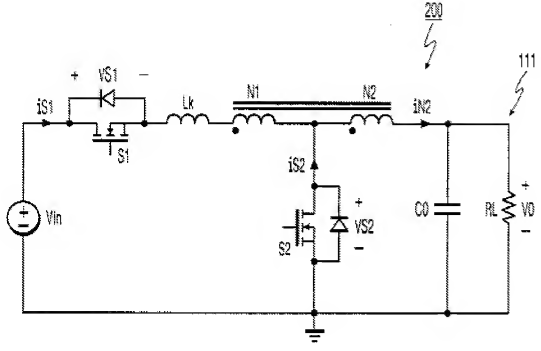


FIG. 2
PRIOR ART

QIAN PRIOR ART

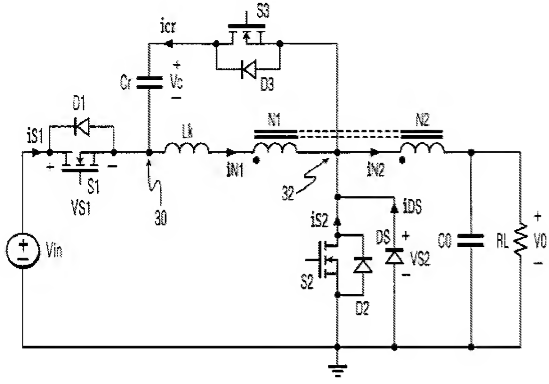


FIG. 4

QIAN'S INVENTION

As can be seen by one of ordinary skill in the art, the teachings of Qian are very close and relevant to the claimed invention. Appellant's N1 and N2 windings correspond to N1 and N2 of the Qian reference, respectively. Appellants S1 and S2 correspond to the to S1 and S2 of the Qian reference, respectively. **The circuit of Appellant's figure 2c and the circuit Qian 2 is the same circuit except for that the fact that Appellant optimized the coefficient of coupling of the transformer to .99 or 1.**

Lk (not a discrete circuit element) is the inherent leakage inductance associated with all transformers devices. Appellant's leakage inductance would be zero for K=1 (coefficient of coupling) Qian realized that this Lk caused certain inefficiencies as disclosed by appellant and agreed that the leakage inductance is associated with the coefficient of coupling. One of ordinary skill in the art would know that the a high leakage inductance implies a low coefficient of coupling and a loosely wound transformer windings and vice versa. One of ordinary skill in the art would also know that Qian at the time of invention could not achieve perfect coupling so the circuit of figure 4 was used to compensate for the leakage inductance and therefore the circuit of S3 and Cr was added to cure this problem. Examiner's position in the latest office action dated October 19, 2007 is that if figure 2 had a high coefficient of coupling then the circuit of S3 and Cr would not be needed. The rejection of November 22, 2006 and those previous was not relied upon and therefore the arguments pertaining to these previous rejection are rendered mute. Please rely upon the latest office action dated October 19, 2007.

As stated in the office action dated October 19, 2007, *The extent to which flux generated in one winding links the other winding is expressed in terms of the winding's coupling coefficient; a coupling coefficient of unity (1), implies perfect coupling (i.e. all the flux which links that winding also links the other winding) and an absence of leakage flux (i.e. none of the flux which links that winding alone). From a circuit viewpoint, the effects of leakage flux (inductance) are accounted for by associating an equivalent lumped value of leakage inductance with each winding. An increase in the coupling coefficient translates into a reduction in leakage inductance: as the coupling coefficient approaches unity, the leakage inductance of the winding approaches. Therefore it would have been obvious to one of ordinary skill in the art to use a*

transformer with coefficient of coupling near unity (optimum value) if it was possible knowing the inherent inefficiencies of high leakage inductances associated with low coefficient of coupling which were not achievable at the time of the prior art as opposed to the present where high coefficient of coupling are achieved now near unity.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The Qian reference was used to teach the if the transformer was optimized (k=1) Qian would arrive at the claimed invention. The Lu reference was used to teach the turns ratio of the transformer relationship and to provide a simplistic approach to control the output voltage and current induced in the secondary by changing the turns ratio of the transformer.

In summary, The Qian realized that inefficiencies occurred because of the high leakage inductance Lk (not a discrete circuit element) caused by the inability to have tightly wound transformer windings and have near unity k=1 (coefficient of coupling =1). Therefore the circuit of figure 4 was introduced to cure these inefficiencies. The Lu reference was introduced to teach the turns ratios.

B. The Examiner's rejection of Claims 7 and 17 under 35 U.S.C. § 103(a) as being unpatentable over Qian in view of Lu et al and further in view of Beckman et al. (U.S. Pat. No. 6,184,666) is proper and should be sustained.

Examiner incorporates the arguments set forth above in section A and respectfully asserts that Claims 7 and. 17 are rejected for at least similar reasons as those set forth for Claim 1 and 11.

C. The Examiner's rejection of Claims 10, 22, 20, 24 under 35 U.S.C. § 103(a) as being unpatentable over Qian in view of Lu et al and further in view of Yang et al. (U.S. Pat. No. 6,404,175) is proper and should be sustained.

Examiner incorporates the arguments set forth above in section A and respectfully asserts that Claims 10, 22, 20 and 24 are rejected for at least similar reasons as those set forth for Claim 1 and 11.

D. The Examiner's rejection of Claims 8, 18 and 25-29 under 35 U.S.C. § 103(a) as being unpatentable over Qian in view of Lu et al and further in view of Dwelley et al. (U.S. Pat. No. 6,166,527) is proper and should be sustained.

Applicant incorporates the arguments set forth above in section A and respectfully asserts that Claims 8, 18 and 25-29 are rejected for at least similar reasons as those set forth for Claim 1 and 11.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

In response to arguments with respect to claim 26 and 27. Please review the Dwelley patent which uses FET's switches in a freewheeling and a conduction switch. It can be seen that the appellant's claimed invention uses different conductivity types to achieve the result of having lower withstanding voltage as can readily be seen the Dwelley reference in figure 2D

discloses FET with different conductivity types for use as freewheeling and conduction type switches.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Bao Q. Vu/
Primary Examiner, Art Unit 2838
July 2, 2008

Conferees:

Darren Schuberg /D. S./

Supervisory Patent Examiner, Art Unit 2834

/Akm Enayet Ullah/

Supervisory Patent Examiner, Art Unit 2838